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3rd International Workshop on Advances and Applications of Problem Frames

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ABSTRACT

Michael Jackson's Problem Frames are a highly promising approach to early life-cycle software engineering. Their focus moves the engineer back to the problem to be solved rather than forward to the software and solving a poorly defined problem. By applying the Problem Frames approach, the software engineer can understand the problem context and how it is to be affected by the proposed software, and ultimately work towards the right solution for the problem. The influence of the Problem Frames approach and related work is spreading in the fields of domain modelling, business process modelling, requirements engineering, software architecture as well as software engineering in general.

Categories and Subject Descriptors

D.2.1 [Software Engineering]: Requirements/Specifications—*Elicitation methods (e.g., rapid prototyping, interviews, JAD), Languages, Methodologies, Tools.*

General Terms

Design, Languages, Theory.

Keywords

Problem Frames, Software Engineering, Requirements Engineering

1. INTRODUCTION

A key challenge for software engineering is to learn how to reconcile the formal world of the machine and its software with the non-formal real world. Problem Frames, proposed by Michael Jackson [7, 6], provide a front-end to software engineering, in which the frames capture the problem domain experience of software engineers, with the intent of allowing it to be reapplied in the analysis of new problems. They are akin to design patterns but instead of focusing on solutions, they deal with problems.

The Problem Frames approach allows (i) the identification and clarification of system requirements, (ii) the understanding and structuring of the problem world, the specification of a hardware/software machine that can ensure satisfaction of the requirements in the problem world, and (iii) the construction of adequacy arguments, convincing both to developers and to customers, users and other interested parties, that a system satisfying such a specification will provide what is needed.

This is the 3rd International Workshop on Advances and Applications of Problem Frames. The first workshop, held at ICSE 2004 [1], was a huge success, with a keynote from Michael Jackson, more than 35 participants, and lively discussion throughout the day. The workshop culminated in the selection of the best papers being published as a special issue of the Journal of Information and Software Technology [3]. This special issue also included an extensive literature review of the field of Problem Frames research up until that point [2].

The second workshop, held at ICSE 2006 [4], continued the success of the first. Dines Bjørner gave a highly entertaining keynote speech at the workshop attended by 32 participants. Selected best papers were also published in a special issue of the Expert Systems: The Journal of Knowledge Engineering [5].

2. CONTRIBUTIONS

For this third workshop, authors were invited to submit full, position and experience papers that were fully reviewed usually by three members of the Programme Committee. The papers accepted for inclusion in the workshop proceedings are summarized below.

2.1 Kaminski, Hall and Wermelinger

Kaminski *et al.* propose a research agenda for comparing the engineering design process related to Problem Frames called Problem Oriented Engineering (POE), with more concrete processes in the Rational Unified Process and other Object-Oriented Analysis and Design methods.

2.2 Li

In this paper, Li proposes a 'rule-based approach to problem progression', where graph transformation is used as a

practical technique for translating requirements into specifications in the Problem Frames approach. To this end, Li proposes several rules for transformation.

2.3 Mannering

Using an extension of the Problem Frames approach called Problem Oriented Software Engineering (POSE), Mannering discusses a systematic transformation of requirements to ‘specific requirements that can be implemented by the machine to be designed’.

2.4 Colombo, del Bianco and Lavazza

In one of the two papers by the authors, Colombo *et al.* report on their experience of applying the Problem Frames approach to model a monitoring system for transportation of dangerous goods such as petrol. The authors discuss the need for a methodology, describe problems that did not fit known problem frames, and propose new frames for them.

2.5 Cai, Jin and Feng

Cai *et al.* use problem diagrams to describe the capability of web service and to identify requirements. They develop a domain ontology to help share the descriptions of both the provided services and the service requests, and show possible automation of the service discovery process.

2.6 Hlousek

Hlousek describes a suitability study of using the Problem Frames approach to gather requirements for intelligent building software systems. In a survey of several hundreds of intelligent buildings specialists, the author asks their opinions on a range of issues including requirements understanding and communication, and inconsistency management.

2.7 Classen, Laney, Tun, Heymans and Hubaux

Based on work using a form of temporal logic to represent events and their effects, Classen *et al.* propose using the Event Calculus as an appropriate description language for problem diagrams. The paper describes rules for describing problem diagrams using such a formalism.

2.8 Wang, He, Gong and Wang

In an attempt to deal with the problem of engineering networked software, Wang *et al.* propose using a particular frame called RGPS. They consider functional and non-functional requirements of those systems, and describe the relationship between RGPS and Problem Frames.

2.9 Vincent

Vincent compares the UML and Problem Frames as a means of understanding requirements for non-IT people. Although not statistically significant, the results are interesting in considering UML as the slightly better vehicle for understanding. This begins an important line of research for the Problem Frames community.

2.10 Colombo, del Bianco and Lavazza

Colombo *et al.* discuss the diversity of conceptual modeling approaches and the need to integrate some of these approaches. In particular, they consider the synthesis of the SysML and Problem Frames approaches and argue that the synthesis can help the transition from the requirements to the design stage.

2.11 Marincic, Mader, Wupper and Wieringa

In this paper, Marincic *et al.* proposes a method for specifying control systems in a step-wise non-monotonic manner, called Non-Monotonic Refinement (NMR). NMR is then compared and contrasted with two other specification techniques: Requirements Progression and KAOS.

2.12 Chen and Jin

Building on previous work, Chen and Jin describe an ontological basis for Problem Frames, which sees tool support as a major and important goal. The ontology serves to guide the development of specifications in the Problem Frames approach.

2.13 Lavazza and del Bianco

Arguing that industrial application of the Problem Frames approach requires support for established development practices, Lavazza and del Bianco describe a way of measuring Problem Frames requirements using the Function Point Analysis.

2.14 Babar, Zowghi, Cox, Tosic, Bleistein and Verner

Considering the need to model business strategy and its relationships to critical requirements, Babar *et al.* propose an adaptation of the Problem Frames approach for that purpose. They also discuss the need to integrate with goal modelling and Map.

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